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(56) Documents Cited

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(58) Field of Search

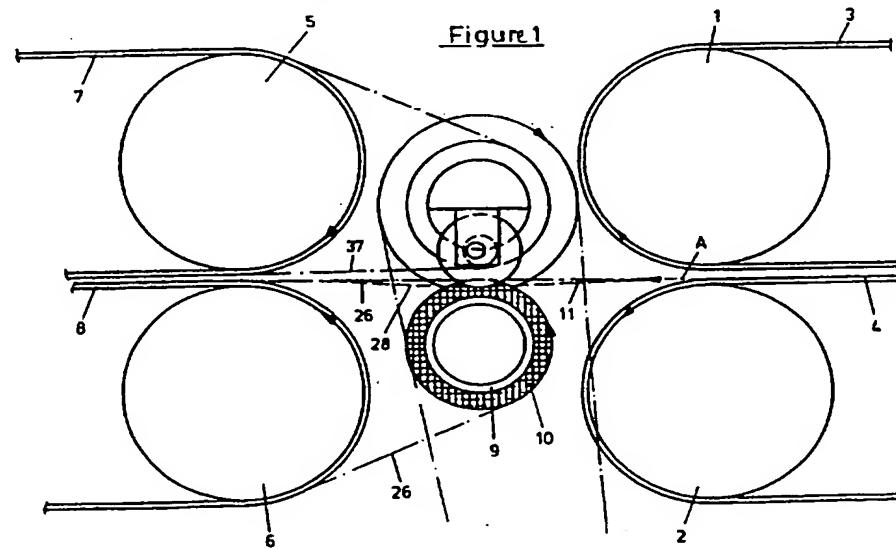
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(54) Abstract Title

Severing webs

(57) A device for severing segments from a tubular web having transverse perforation lines, includes a first continuous conveyor belt unit 1 - 4, and a following tear-off continuous conveyor belt unit 5 - 8 driven at a higher speed during separation. To achieve a good clean tear, a tear is started at the perforations lines by rolls (17 figure 2) on a rotating shaft (13) above a widthwise driven rubber-covered roller 9, 10.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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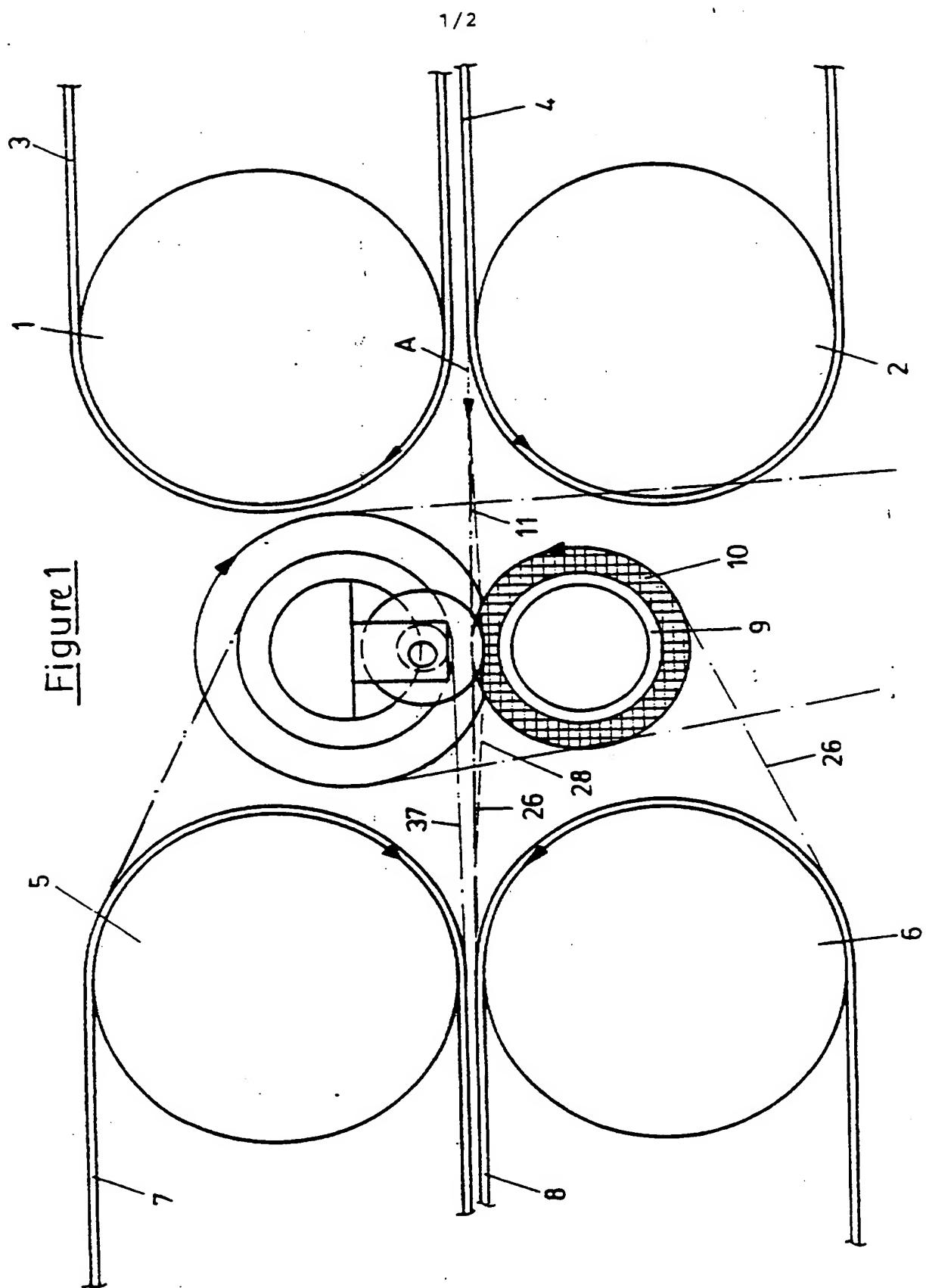


Figure 1

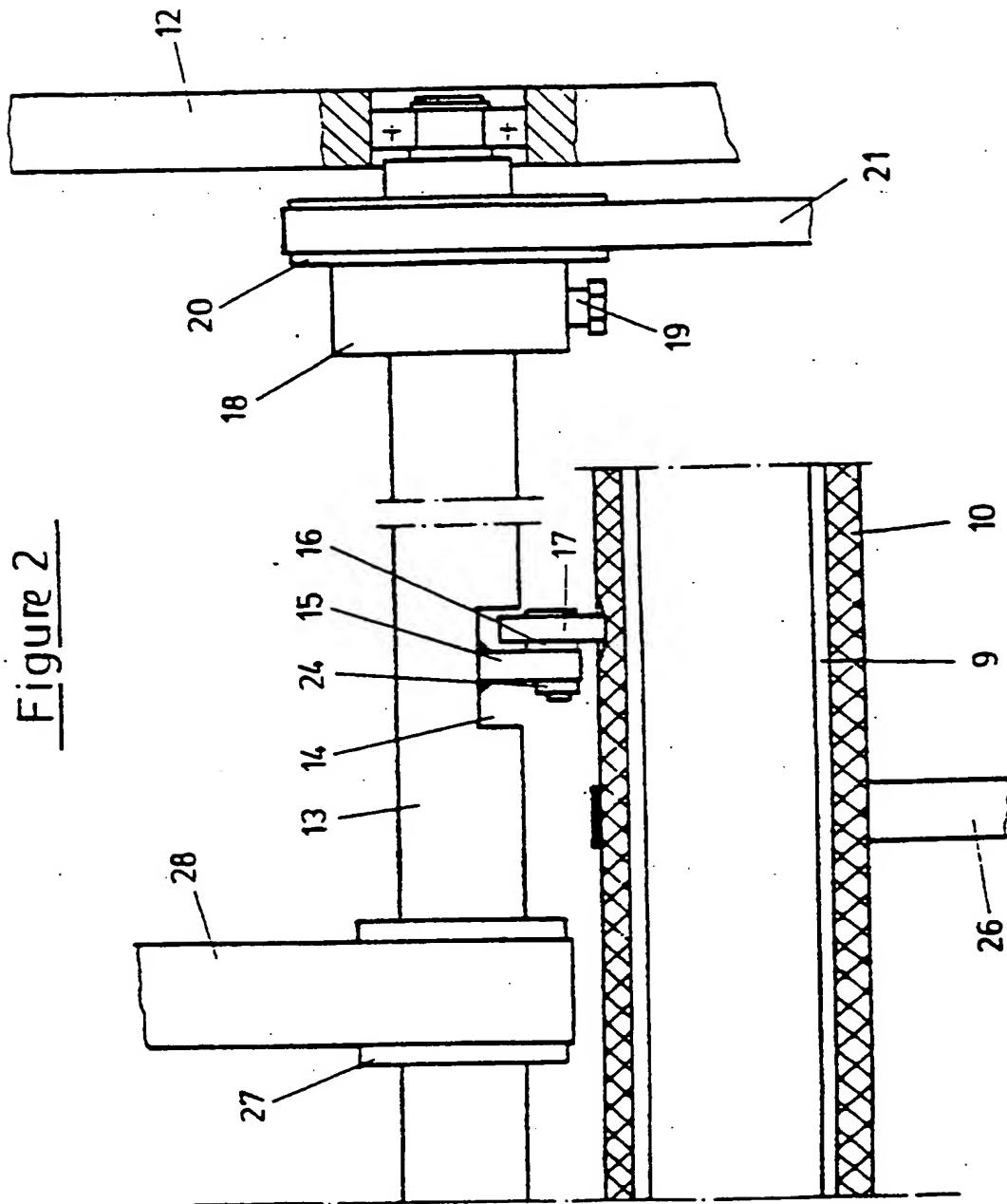


Figure 2

Device for Severing Tubular Segments from a Tubular Web
provided with Transverse Perforation Lines

5 The invention relates to a device for severing tubular segments from a tubular web provided with transverse perforation lines, said device comprising a redrawing and holding unit, and a tear-off unit which follows said redrawing and holding unit in the tubular web's conveying direction. Both of these units exhibit, on both sides of
10 the tubular web to be severed, opposing rollers on pulleys over which the continuous conveyor belts run. These rollers or pulleys drive the conveyor belts of the tear-off unit at a speed higher than that of the redrawing and holding unit at least during the separating process.

15 Devices of this type are known from DE 41 13 792 A1 and DE 42 43 105 A1. The tubular web from which the tubular segments are to be torn off behave differently as a function of the material from which the tubular webs are made and also the moisture content of the material so that
20 the tear-off takes place sooner or later, unless other measures are also taken in order to achieve a good tear-off.

25 Therefore, the object of the invention is to provide a device of the aforementioned kind, which always guarantees a good and clean tear-off, independently of the material from which the tubular webs are made, and also independently of the moisture content of the material.

30 Accordingly, a first aspect of the invention solves this problem by providing a device for severing tubular segments from a tubular web provided with transverse perforation lines, said device comprising:- a redrawing and holding unit; a tear-off unit which follows said redrawing and

holding unit in the conveying direction of the tubular web, both of which units exhibit rolls or rollers over which run continuous conveyor belts of which the conveyor belts of the tear-off unit are driven at a speed which, at least 5 during the separating process, is higher than that of the belts of the redrawing and holding unit; and means between the redrawing and holding unit and the tear-off unit, which acts on the transverse perforation lines synchronously with their passing and introduces a starting tear at the 10 perforation line.

The tear-off of the tubular segments, from the tubular web provided with transverse perforation lines, requires a higher amount of force when all of the links of the 15 transverse perforation lines have to be severed at once. In the device of the invention a short-term increase in tension is exerted by means of the device, initiating the start of the tear in the region of the web's transverse perforation line on a short longitudinal segment of the 20 tubular web, which is located between the redrawing and holding unit and the tear-off unit. This increase in tension results in a starting tear whose consequence is a fast, smooth tear-off of the tubular segment. Owing to the means introducing the tear-off, the device according to the 25 invention is largely insensitive to different materials being torn, and to the states of material being torn so that a good tear-off of the tubular segments is always guaranteed.

It is expedient that the means introducing the tear-off 30 comprise a roller which is arranged on one side of the tubular web and has an elastic shell, and at least one pressure element, for example a roll or a stamp, which is located on the opposite side of the tubular web and 35 revolves around an axis parallel to the axis of the roller,

which with every passing of a transverse perforation line penetrates into the elastic roller shell in the area of the transverse perforation line. The pressure element produces a point-shaped (sharply localised) increase in tension in
5 the transverse perforation line which is under tension, so that a starting tear is provided in the transverse perforation line and leads quickly to the desired tear-off of the tubular segment.

10 A preferred embodiment provides that the roll forming the pressure element is mounted, by means of a bearing block, on a shaft which has an axis parallel to the roll and which is driven synchronously with the passing of the transverse perforation lines. Thus the roll forces point-by-point
15 said transverse perforation lines into the roller's elastic shell, in phase with the passing of the perforation lines, so that an increase in tension that introduces the tear-off takes places in the transverse perforation line.

20 Expediently the roll is mounted on an axle, which is mounted on the bearing block by means of an eccentric pin, so that by turning the pin the roll's depth of penetration into the elastic shell of the roller can be adjusted. The pin can be held in a bore of the bearing block with so much
25 friction that said pin can be rotated by means of a tool for the purpose of adjustment, but cannot be rotated in the bore during operation. Of course, there can also be screws, nuts or the like, by means of which the fastening of the pin in the bore of the bearing block can be
30 temporarily loosened or undone for the purpose of adjustment.

Another embodiment of the invention provides that the shaft can be rotated and locked in a collar provided with a drive pulley. By loosening the shaft and rotating the collar and
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finally refastening, the shaft's angle of rotation at which the pressure element or the roll engages with the tubular web can be adjusted in the desired manner relative to the transverse perforation lines.

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Another embodiment of the invention provides that the roller with elastic shell is driven by means of at least one belt which runs beyond the belts at one side of the tear-off unit or its rear deflecting roller.

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A second aspect of the invention provides a device for severing tubular segments from a tubular web provided with transverse perforation lines, said device comprising:- a redrawing and holding unit; a tear-off unit which follows said redrawing and holding unit in the conveying direction of the tubular web, both of which units exhibit rolls or rollers over which run continuous conveyor belts of which the conveyor belts of the tear-off unit are driven at a speed which, at least during the separating process, is higher than that of the belts of the redrawing and holding unit; and at least one freely rotating roll which is mounted on the shaft and which is driven by at least one belt which runs beyond the belts of the tear-off unit or its rear deflecting roller to one side of the path of the tubular web, wherein the shaft is displaced to the other side of said tubular web path.

In this manner the conveyor belts driving the roller, and the belt running over the freely rotatable roll, form an inlet slit for the tubular web's leading end after the tear-off of the tubular segment so that said leading end can travel into the tear-off unit without any problems. Expediently the roll exhibits such a diameter that its generatrix facing the roller lies so far above the conveying path for the tubular web that the result is a

relatively wide inlet slit that tapers off in the direction of the tear-off unit.

In order that the present invention may more readily be understood, one embodiment of the invention will be explained below, purely by way of example, with reference to the accompanying drawings in which:-

FIGURE 1 is a schematic drawing of the transition region between the redrawing and holding unit and the tear-off unit, and shows the device introducing the starting tear; and

FIGURE 2 is a sectional front view of the device introducing the starting tear.

Figure 1 shows the rear upper and bottom deflecting rollers 1, 2 of the redrawing and holding unit, over which run the continuous conveyor belts 3, 4 whose opposing carrying runs 20 convey the tubular web tightly through the redrawing and holding unit in the direction of arrow A.

Then the tubular web issuing between the rear deflecting rollers 1, 2 of the redrawing and holding unit runs into the tear-off unit. Figure 1 also depicts only the rear deflecting rollers 5, 6 of the tear-off unit, over which rollers the continuous groups of conveyor belts 7, 8 run. The carrying runs of the conveyor belts 7, 8 that face each other form the conveying length over which they convey the segments to be torn off, at least temporarily at a speed that is raised with respect to that of the redrawing and holding device so that, in the area between the redrawing and holding unit and the tear-off unit, the tear-off action takes place along the transverse perforation lines.

In the space between the predrawing and holding unit and the tear-off unit, there is a roller 9 which bears a shell 10 made of elastic material, for example rubber. This roller 9 is mounted so as to rotate freely in the machine frame (not illustrated). The upper shell line (generatrix) of the roller 9, 10 lies approximately in the conveying path of the tubular web which path is indicated by a dash-and-dot line 11. Above the roller 9, 10, a shaft 13 is mounted so as to rotate by means of roller bearings 3 in the machine frame, of which only a side stand 12 is shown in Figure 2. This shaft 13 has, in a recess 14, a welded-in bearing block 15 in which is mounted an axle 16 which is parallel to the shaft 13 and on which a disk-shaped roll 17 is freely rotatable. The one end of the shaft 13 is held in a bore of a collar 18 and fastened in said bore with a setscrew 19. The collar 18 bears a belt pulley 20 by which the shaft 13 is driven by means of a belt 21. The drive occurs in such a manner that the roll 17 forces the adjacent part of the tubular web into the elastic shell 10 of the roller 9 synchronously with the passing of the transverse perforation lines, as is evident from Figures 1 and 2.

The drive belt 21 drives the shaft 13 synchronously with the passing of the transverse perforation lines in such a manner that the roll 17 always forces the tubular web in the area of the transverse perforation lines into the elastic roller shell 10. To set the correct phase angle, the shaft 13 can be rotated in the collar 18 with the setscrew 19 loose and fastened in the correct phase position by tightening of the setscrew 19.

The axle 16 bearing the roll 17 is provided with a pin 24 which is eccentric relative to the axle 16 and over which said axle is held in a bore of the bearing block 15. By

rotating the eccentric pin 24 and then fastening it in the bore of the bearing block 15, the depth of penetration of the roll 17 into the elastic roller shell 10 can be set.

5 Several, for example three to five, contact rollers 17 can be arranged over the length of the shaft 13.

10 The roller 9, 10 is driven by several belts 26 which run, in the manner shown in Figure 1, beyond belts 8 of the bottom group of belts of the tear-off unit.

15 Mounted on the shaft 13 is at least one roll 27, which can be freely rotated on said shaft by means of bearing blocks and over which runs a belt 28, which drives said roll and which runs beyond a belt of the belt group 7 of the tear-off unit. In the manner shown in Figure 1, the belts 26, 27 form tapering inlet guides for the tubular web.

20 Figure 1 indicates, by means of a dash-and dot line 28, the deflection produced by the increase in tension produced as a result of forcing the tubular web into the elastic roller shell 10 in the area of a transverse perforation line.

C L A I M S

1. A device for severing tubular segments from a tubular web provided with transverse perforation lines, said device comprising:- a redrawing and holding unit; a tear-off unit which follows said redrawing and holding unit in the conveying direction of the tubular web, both of which units exhibit rolls or rollers over which run continuous conveyor belts of which the conveyor belts of the tear-off unit are driven at a speed which, at least during the separating process, is higher than that of the belts of the redrawing and holding unit; and means between the redrawing and holding unit and the tear-off unit, which acts on the transverse perforation lines synchronously with their passing and introduces a starting tear at the perforation line.
2. A device as claimed in claim 1, wherein the means initiating the tear-off comprises a roller arranged on one side of a path for the tubular web and having an elastic shell, and at least one pressure element, which is located on the opposite side of the path of the tubular web and revolves around an axis parallel to the roller axis, in which upon every passing of a transverse perforation line penetrates into the elastic roller shell in the area of the transverse perforation line.
3. A device according to claim 2, wherein said at least one pressure element is a roll or a stamp.
4. A device as claimed in claim 3, wherein the roll forming the pressure element is mounted by means of a bearing block on a shaft which has an axis parallel to

that of the roll forming the pressure element and which is driven synchronously with the passing of the transverse perforation lines.

5 5. Device as claimed in claim 4, wherein the roll is mounted on an axle which is mounted in the bearing block by means of an eccentric pin so that by turning the eccentric pin the depth of penetration of the roll into the elastic shell of the roller can be adjusted.

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6. A device as claimed in either one of claims 4 and 5, wherein the shaft can be rotated and locked in a collar provided with a drive pulley.

15 7. A device as claimed in any one of claims 4 to 6, including at least one freely rotating roll which is mounted on the shaft and which is driven by at least one belt which runs beyond the belts of the tear-off unit or its rear deflecting roller to one side of the path of the tubular web, wherein the shaft is displaced to the other side of said tubular web path.

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8. A device as claimed in any one of claims 2 to 7, characterized in that the roller having the elastic shell is driven by means of at least one belt which runs beyond the belts at one side of the tear-off unit or its rear deflecting roller.

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9. A device for severing tubular segments from a tubular web provided with transverse perforation lines, said device comprising:- a redrawing and holding unit; a tear-off unit which follows said redrawing and holding unit in the conveying direction of the tubular web, both of which units exhibit rolls or rollers over which run continuous conveyor belts of which the

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conveyor belts of the tear-off unit are driven at a speed which, at least during the separating process is higher than that of the belts of the redrawing and holding unit; and at least one freely rotating roll which is mounted on the shaft and which is driven by at least one belt which runs beyond the belts of the tear-off unit or its rear deflecting roller to one side of the path of the tubular web, wherein the shaft is displaced to the other side of said tubular web path.

10. A device for severing tubular segments from a tubular web provided with perforation lines, such device being constructed and arranged substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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The
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Office

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Claims searched: 1, 9

Examiner: Howard Reeve
Date of search: 4 August 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): B4B, B8R

Int Cl (Ed.6): B26F (3/00, 3/02); B65H (35/10)

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	US 5480083 (WINDMOLLER & HOSCHER), whole document	1
Y	US 5141142 (PITNEY BOWES), see roller 32 in particular	1
Y	US 4984728 (WINDMOLLER & HOLSCHER), whole document	1
Y	US 4618085 (TOSHIBA), see rollers 1301	1
Y	US 4529114 (MOORE BUSINESS FORMS), see breaker 28	1
Y	US 4498894 (ICOMA), whole document	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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